

ATLAST: A Potential Large-Aperture UVOIR Space Observatory Reference Design

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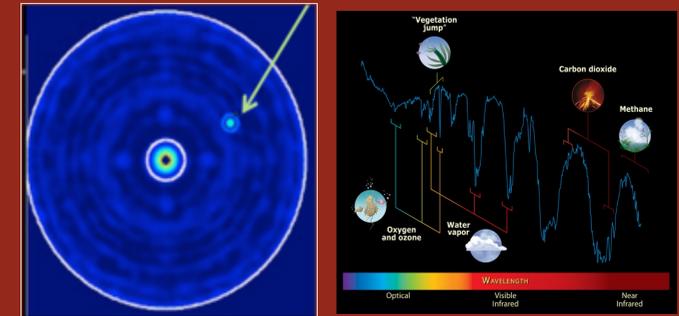
What This is About

Our study team used major community-developed science goals to derive mission needs, requirements, and candidate architectures for a future large-aperture general-purpose UVOIR space observatory. Reference designs have been developed for non-cryogenic telescopes that operate over the UVOIR to achieve multiple goals and carry forward the legacy at these wavelengths of the *Hubble Space Telescope*.

Overview

Concepts were assessed for general-purpose UVOIR observatories with segmented primaries as large as 9.2 meters using existing launch vehicles and monolithic optics as large as 8 meters using SLS. Preliminary designs studied for telescopes using SLS include segmented apertures as large as about 12 meters. Increasingly detailed study of a 9.2-meter segmented aperture permits in-depth reference designs, selection of priority technologies, and confirmation of achievable science goals. Our analysis includes thermal and dynamic stability to achieve wave front error stability on the order of picometers. The engineering development program is integrated with the technology development program to validate end-to-end concepts for a cost-effective mission.

Identification of Habitable Zone Planets and Detection of Biosignatures



The Advanced Technology Large-Aperture Space Telescope (ATLAST)

Launch Vehicles

Our 10 meter-class segmented mirror reference mission concept is compatible with the existing Delta IV Heavy launch vehicle. The Falcon Heavy vehicle is under development and can provide larger mass-to-orbit capabilities than the Delta. The SLS will provide much greater capabilities that may enable an 8 meter monolith or very large segmented apertures.



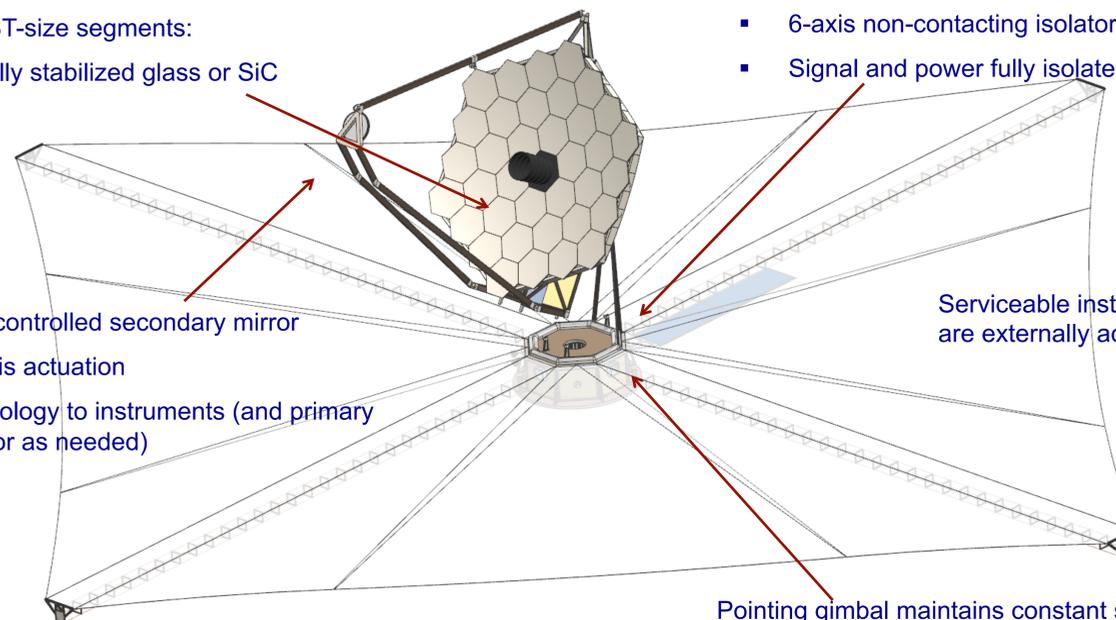
10 m-class telescope stowed in 5 m Delta IV fairing

Reference Design

36 JWST-size segments:
thermally stabilized glass or SiC

- Actively controlled secondary mirror
- 6-axis actuation
 - Metrology to instruments (and primary mirror as needed)

- Telescope Isolated from the spacecraft
- 6-axis non-contacting isolator
 - Signal and power fully isolated



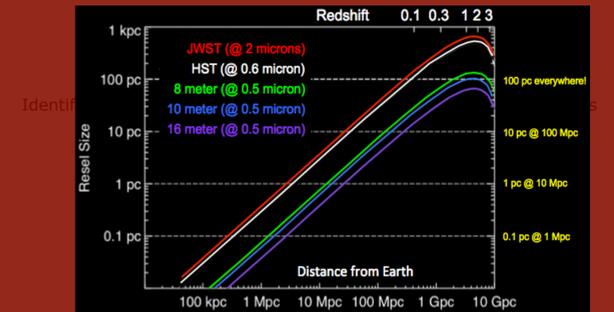
Serviceable instruments are externally accessible

Pointing gimbal maintains constant sun angle; Single pointing axis enhances stiffness

Three-layer sunshield, deployed from below using four booms

- Sunshield kept at a constant angle to the Sun: a warm, stable thermal sink
- Stray light protection from Sun, Earth and Moon

Resolve 100 pc Star-Forming Regions Everywhere in the Universe



Breakthrough in UVOIR Resolution and Sensitivity Throughout the Universe

